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THE NORMAL BREEDING SEASON AND GESTATION PERIOD OF MARTENS

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INTRODUCTION

In 1913, the Bureau of Biological Survey started preliminary breeding experiments with martens (*Martes americana*) at Pritchard, Idaho. When the fur farm at that place was abandoned in 1915, the martens were shipped to Washington, D. C., where for a short time they were kept in the National Zoological Park. After the establishment of the bureau's experimental fur farm in the foothills of the Adirondack Mountains near Keeseville, N. Y., 6 martens were shipped from Washington in August, 1916. At the end of January, 1917, 4 additional martens were obtained, making a total of 10 breeding animals under observation. Six of these martens were lost between the breeding season of 1917 and that of 1918—3 died from disease and 2 from injuries, and 1 escaped. The breeding stock for the year 1918 was thus reduced to 4 animals.

Until the spring of 1920 the males were not allowed to run with the females, except during January, February, and the early part of March, which had been considered the breeding period. No young were produced during the eight years from 1913 to 1920.

BEGINNING OF EXPERIMENTS

During the fall of 1919 and the spring of 1920, considerable difficulty was experienced in keeping the males and females separated, because they frequently burrowed under the carpet wire. They mingled considerably that fall and in the winter of 1919-20, and it was observed that they seemed to live together harmoniously. This observation differs from those of A. H. Cocks,¹ who had conducted experiments with martens in England. Mr. Cocks and many other naturalists have reported that martens do not live happily

¹ COCKS, A. H. NOTE ON THE GESTATION OF THE PINE-MARTEN. Proc. Zool. Soc. London 1900: 836-837. 1900.

together and will destroy one another if both sexes are put in the same pen when the female is not in heat.

A general belief had prevailed that the only time of year that male martens could be permitted to live with females was during the months of January and February. Since this was found not to be the case at the United States Fur-Animal Experiment Station, it was decided to allow the males to run with the females during all seasons of the year, except in spring, when the young are born. The martens were reasonably tame, well fed, and in an apparently healthy condition. It was natural, therefore, to expect that they would mate and produce young. Some consideration of this problem led to the theory that possibly martens in captivity breed at another period of the year than do those in the wild, the commonly accepted opinion being that in the wild they mate in January or February. If this were true, the explanation of the fact that there were no matings and no young born at the experiment station would be that the two sexes were not allowed to run together at the proper time.

On May 10, 1920, the males were turned in with the females. They lived together in a friendly manner until the latter part of July and the early part of August. About this time they squealed considerably and it was noted that one of the females had received a severe injury to one ear. It was suspected that the martens were fighting, and separating the sexes was considered. Early on the morning of August 13, 1920, the martens were making so much noise that the caretaker made a special visit to the pens and saw one pair mate; observations later in the day revealed this as the cause of the peculiar noise.

The male that had been seen to mate had a tumorlike growth of the sheath, which it was thought might interfere with service. Another male was therefore introduced, and this one also was seen to serve several times. The next day it was removed and the first one returned. When this male first entered the pen, he failed to notice the female, which was on the ceiling wire, but as soon as he discovered her, he ran up, seized her by the nape of the neck, and carried her down to the ground and served her. This female was seen to mate on several occasions in the four days from August 13 to 16.

On August 26, 1920, the females were put in separate pens and kept there until the latter part of November, when they were again turned in with the males and animals of both sexes allowed to run together until April 4, 1921. They were then separated again.

The female that was seen to mate during August, 1920, appeared to take on considerable weight from one to two months afterwards. She gave birth to a litter of three on April 15, 1921. When the nest box was examined one of the young appeared to be dead, but it was not removed because the female was extremely nervous and excited. The next time the nest box was opened, only two young could be found. There was no trace of the third. Since the mother was very nervous and prone to carry the young roughly about the pen whenever someone went near the den, it was deemed advisable to disturb her and her litter as little as possible until the young were about a month old. This female had been in captivity since December, 1917, without producing any young, even though every

year she had been allowed to run with a male throughout January and February.

During the summer of 1921 it was planned to keep the martens under close observation to note matings and then to segregate the mated females until late in the spring of the following year. Conditions were not satisfactory, however, for carrying out these plans. Since no matings were observed that summer, the males were allowed to run with the females from July 13, 1921, to April 1, 1922. Although no matings were observed during this period, the same marten that produced and reared the litter in 1921 gave birth to three female young on April 16, 1922.

During the summer of 1922 the males were turned in with the females each morning, but at night they were kept in separate pens, in order to avoid the possibility of unobserved matings taking place at night. When the females came into heat, the males sometimes served them immediately after they were turned in in the morning, and usually within an hour after admission, often in spite of the immediate presence of observers. All three males used in these experiments proved to be polygamous.

The old female that had produced the two litters previously mentioned was seen to accept service several times between July 28 and August 6, of that year, as did also one of the young females, less than 4 months old, several times between August 4 and 19, as well as on September 3, though not between August 19 and September 3. Both of the litter mates of this younger animal were seen to mate on August 6.

The females were separated from the males on September 10, 1922, and kept in pens by themselves until July, 1923, in order to determine whether the gestation period was approximately 8 months, as the aforementioned observations indicated. In January, 1923, two of the four females that had mated during the previous summer died, but no evidences of pregnancy were noted in either. One was the animal that had reared the two litters, and the other was a young female born in the spring of 1922. The other two females, both of which were seen to mate during the previous summer, failed to produce young in the spring of 1923.

In 1923 there were three female and three male martens. All three females were seen to mate during August, 1923. These were separated from the males in September, as in the year before, but no young were produced. Late in the fall of 1923, the martens were moved to the new fur-animal experiment station of the Biological Survey at Saratoga Springs, N. Y.

There were only 3 females and 2 males left in the summer of 1924. One of the females was killed within a few hours after it was placed in a pen with another female. The 2 remaining females both showed signs of heat in August, but only 1 was seen to mate. Both males were about 10 years old and showed indications that their usefulness was at an end. No young were born in the spring of 1925.

Both females mated during August, 1925, but no young resulted the following spring. One of the two females on hand in the summer of 1926 was seen to mate during August. Each of the two females was allowed to run with a male throughout the summer and winter months, but neither produced young in the spring of 1927.

On April 6, 1927, a female that was trapped in the wild during the latter part of December, 1926, gave birth to a litter of three young, two of which were reared to maturity. This female had access to a male only a few hours every other day during the last three weeks of February, but it is not believed that she mated at any of these times, as it was observed that she would not tolerate the presence of the male. When he attempted to enter her pen, she invariably drove him back to his own. The indications were that this female mated in the wild some time before she was trapped.²

In the summer of 1927 there were 4 adult females and 4 adult males, and 2 young martens, one male, the other female. All but 1 of the 4 adult females were seen to mate in August, 1927. The female that had weaned her young just a short time before refused to tolerate the presence of a male. As during the previous winter, she invariably drove the male out when he entered her pen. Although the males were allowed to run with the females from early in July until the end of February, no young were born in the spring of 1928.

EXPERIMENTS OF 1928

During the summer of 1928 the marten stock consisted of 13 adult animals, 7 females and 6 males. Six of the seven females were seen to mate between July 11 and August 12, most of them several times. On July 19 one of the males killed the mate he had served on July 11, and a little later it was decided not to use him again that season, as he proved too rough and vicious when with the females. The males were kept in separate pens at night and allowed to run with the females during the daytime only, to facilitate better observation of matings. On September 4, 1928, all the females were separated from the males and placed in pens by themselves until early in the summer of 1929. On April 23, 1929, one of the females that mated on July 22 and 23 and August 6 and 7, 1928, gave birth to a litter of young, although she had not been with a male since September 4, 1928. This finding demonstrated conclusively that the summer matings resulted in conception and that the gestation period ranged from 259 to 275 days or from 8½ to 9 months. (It was not known from which mating the female conceived.)

GENERAL BREEDING HABITS OF MARTENS

In these experiments it was found that the male and female martens usually live together agreeably during most seasons of the year. Occasionally some of the females seemed partial to certain males, especially to those with which they had been allowed to run for some time prior to the oestrus. During the first week or so of the post-oestrus period the male may be inclined to annoy the female, as is noted by the antagonistic attitude she assumes toward him. Before long, however, he discontinues attempts to mate.

Male martens usually fight ferociously whenever they come in contact; the same seems to be true of females.

²ASHBROOK, F. G., and HANSON, K. B. PROGRESS REPORT OF MARTEN BREEDING EXPERIMENTS, U. S. Dept. Agr. Biol. Surv. Leaflet Bi-949, 5 p. [mimeographed], November, 1927; and BREEDING MARTENS IN CAPTIVITY, Journ. Heredity 18 (11): 499-503, illus., November, 1927.

In many females there are two periods of two or three days each during which they will accept service. These two periods are usually from one to two weeks apart.

During the oestral period the female frequently makes a clucking noise entirely different from that made at other times, apparently a call to attract the male. She squats and urinates frequently, especially on stones and other objects in the pens, and climbs and mounts the male when he is apparently passive. Quite often she switches her tail nervously and wrestles with him considerably, though squealing loudly when he treats her too roughly. When she does not accept service readily, the male will chase and struggle with her until mating is accomplished.

The question has arisen in connection with these experiments with martens whether the fertilized ovum may lie in a dormant state for several months before noticeable embryonic development begins, as in the roe deer. Williams³ in discussing the duration of pregnancy in wild animals, states:

Harms notes the peculiar fact that in the deer there is a period of 40 weeks between fertilization and the birth of the young, but that this time does not represent the period of development of the fetus as we understand it in most animals. The ovum of the deer undergoes segmentation and then lies in the uterus for 4 months in an essentially dormant state. About December the distinctive embryonic development begins, and birth follows in May or June—about 5 months later. * * * It is suggested that this delay in the development of the young is a provision by which it may be born at a favorable season of the year.

Apparently the same condition obtains with martens, as females trapped and killed in the wild have not shown macroscopic signs of pregnancy until late in winter.

RESEARCH IN OTHER COUNTRIES

Heinrich Prell, of Munchen, Germany, after a visit to the United States during the winter of 1927 for the purpose of studying fur-farming developments, wrote the Biological Survey as follows:

One of our German breeders on my advice has kept together a pair of stone martens. On July 16 he observed a mating at about 9 o'clock in the morning and again about 5 in the evening. A forester observed a pair of martens mating at about 4 o'clock in the morning. These two observations may prove that the European marten [*Martes foina*] has the same biology as the American marten.

On advice from Doctor Prell, H. Reinhardt conducted experiments with stone martens. He observed matings on July 16, 1927, July 5, 6, and 7, 1928, and on June 28, 1929. The first young were born on April 7, 1929. The information contained in Doctor Reinhardt's article⁴ is almost identical with our observations in the United States.

V. Generosoff, of Leningrad, Russia, in a letter to the Biological Survey states:

Your discovery of the breeding period of American martens leads me to believe that the same is true of our sables [*Martes zibellina*] * * *. This

³ WILLIAMS, W. L. VETERINARY OBSTETRICS, p. 169. Ithaca, N. Y. 1917.

⁴ REINHARDT, H. BEITRAG ZUR ZUCHT UND JUGENDENTWICKLUNG DES STEINMARDERS. Deutsche Pelztierzüchter No. 15:445-448. Munchen. 1929.

year (1929) litters were received on two sable and fox farms; also a sable gave birth to three young ones, which were successfully raised to maturity. It is my personal opinion that investigations of sable farming were promoted by your marten-breeding experiments, and for that my countrymen are indebted to you.

SUMMARY

The normal breeding season in martens occurs during the summer months, usually between the middle of July and the third week in August, and not during the winter months.

From these experiments it has been definitely determined that the gestation period ranges from approximately $8\frac{1}{2}$ to 9 months (259 to 275 days), instead of 60 to 102 days as has been heretofore generally accepted to be the case.

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